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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,742	12/06/2004	Suk Hun Lee	3449-0407PUS1	6987

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EXAMINER	
LEE, CHEUNG	
ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/516,742	LEE, SUK HUN	
	Examiner	Art Unit	
	Cheung Lee	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10 and 11* is/are rejected.

7)☒ Claim(s) *8 and 9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

HA NGUYEN
PRIMARY EXAMINER

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12-6-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on December 6, 2004 was filed before the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Shakuda (US Pub. 2002/0125492).

Referring to figures 1(a)-6, Shakuda discloses a method for fabricating a nitride semiconductor, the method comprising the step of: (a) growing a GaN-based buffer layer (23, 24) formed on a substrate 21 in any one selected from a group consisting of a three layered structure $Al_yIn_xGa_{1-x,y}N/In_xGa_{1-x}N/GaN$ where $0 <= x <= 1$ and $0 <= y <= 1$, a two-layered structure $In_xGa_{1-x}N/GaN$ where $0 <= x <= 1$ (page 3, paragraph 38; page 5, paragraph 83), and a superlattice structure of $In_xGa_{1-x}N/GaN$ where $0 <= x <= 1$, the

two-layered structure will be GaN/GaN when x = 0, Shakuda discloses low-temperature GaN 23/high-temperature GaN 24 for buffer layers, so the claimed limitation is met; and (b) growing a GaN-based single crystalline layer 25 (page 2, paragraph 27; page 3, paragraph 39) on the grown GaN-based buffer layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 2-3 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shakuda in view of Kano et al. (US Pub. 2001/0035531; hereinafter "Kano").

4. With respect to claims 2 and 10, Shakuda does not disclose wherein the step (b) comprises the step of: growing an indium-doped GaN layer; growing an undoped GaN layer on the indium-doped GaN layer; and growing a silicon-doped n-GaN layer on the undoped GaN layer.

Referring to figures 1-11, Kano discloses an InGaN/AlGaN layer 50; an undoped GaN layer 6 (page 6, paragraph 87) formed on the InGaN/AlGaN layer; and a silicon-doped n-GaN layer 7 (page 7, paragraph 97, Table 2) formed on the undoped GaN layer.

At th e time of the invention it would have been obvious to a person of ordinary skill in the art to use doped and undoped layers before n-GaN layer, as taught by Kano.

The motivation for doing so would have been to reduce lattice defects and to improve crystallinity (Kano, page 3, paragraph 42).

5. With respect to claims 3 and 11, Shakuda does not disclose wherein the step (b) comprises the step of: growing an undoped GaN layer; growing an indium-doped GaN layer on the undoped GaN layer; and growing a silicon-doped n-GaN layer on the indium-doped GaN layer.

Referring to figures 1-11, Kano discloses an undoped GaN layer 3; an InGaN/AlGaN layer 30 formed on the undoped GaN layer; and a silicon-doped n-GaN layer 7 (page 7, paragraph 97, Table 2) formed on the indium-doped GaN layer. The arguments and motivation stated in claim 2 also apply.

6. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doverspike et al. (US Pat. 6459100; hereinafter "Doverspike") in view of Shakuda.

7. With respect to claim 4, referring to figure 1, Doverspike discloses a nitride semiconductor light emitting device comprising: a substrate 11; a GaN-based buffer layer 13 formed on the substrate; a first electrode layer of an n-GaN layer 20 formed on the GaN-based buffer layer, the silicon-doped n-GaN layer (col. 5, lines 50-55) is first electrode layer as disclosed in specification; an activation layer 12 formed on the first electrode layer; and a second electrode layer of a p-GaN layer 23 formed on the activation layer, the Mg-doped p-GaN layer (col. 5, lines 55-65) is second electrode layer as disclosed in specification. However, Doverspike does not disclose expressly wherein the GaN-based buffer layer formed on the substrate in any one selected from a

group consisting of a three layered structure $Al_yIn_xGa_{1-x,y}N/In_xGa_{1-x}N/GaN$ where 0 <= x <= 1 and 0 <= y <= 1, a two-layered structure $In_xGa_{1-x}N/GaN$ where 0 <= x <= 1, and a superlattice structure of $In_xGa_{1-x}N/GaN$ where 0 <= x <= 1.

Referring to figures 1(a)-1(f), Shakuda discloses a GaN-based buffer layer (23, 24) formed on a substrate 21, the GaN-based buffer layer compreses low-temperature GaN 23/high-temperature GaN 24 for buffer layers. When x = 0, the claimed two-layered structure will be GaN/GaN, so the claimed limitation is met.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the buffer structure, as taught by Shakuda.

The motivation for doing so would have been to minimize and relax the lattice mismatch efficiently (Shakuda, page 2, paragraph 28).

8. With respect to claim 5, Doverspike in view of Shakuda discloses wherein further comprising: an indium-doped GaN layer (Doverspike, 12) formed on the GaN-based buffer layer; and an undoped GaN layer (Doverspike, 15) formed on the indium-doped GaN layer.

9. With respect to claim 6, Doverspike in view of Shakuda discloses wherein further comprising: an undoped GaN layer (Doverspike, 14) formed on the GaN-based buffer layer; and an indium-doped GaN layer (Doverspike, 12) formed on the undoped GaN layer.

Allowable Subject Matter

10. Claims 8 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: claim 8 recites the GaN-based buffer layer is grown by introducing sources of TMGa, TMIn and TMAl and a gas of NH_3 at the same time while supplying carrier gases of H_2 and N_2. This feature in combination with the other elements of the claims are neither disclosed nor suggested by the prior art of record.

Claim 9 depends from claim 8, so it is objected for the same reason.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheung Lee whose telephone number is 571-272-5977. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cheung Lee

April 13, 2006

HA NGUYEN
PRIMARY EXAMINER